Claims:

1. A magnetic anomaly sensing system, comprising:

a plurality of triaxial magnetometer (TM) sensors with each of said TM sensors having X,Y,Z magnetic sensing axes, said plurality of said TM sensors arranged in a three-dimensional array with respective ones of said X,Y,Z magnetic sensing axes being mutually parallel to one another in said three-dimensional array;

said three-dimensional array defining a geometry that (i) collinearly aligns at least three of said plurality of TM sensors in a spaced-apart fashion along an axis to form a plurality of single-axis gradiometers along one of said X,Y,Z magnetic sensing axes, and (ii) positions at least four of said plurality of TM sensors in a spaced-apart fashion in a planar array that is perpendicular to said axis; and

processing means coupled to each of said plurality of TM sensors for generating

(i) partial gradient contractions for each of said single-axis gradiometers, and

(ii) partial gradient contractions, and complete gradient tensors and corresponding complete gradient contractions for gradiometers formed by said planar array, in order to provide data that can be used to

(a) align said axis of said three-dimensional array with a magnetic target, and

(b) once said axis is aligned with said magnetic target, uniquely determine (i) distance to said magnetic target, (ii) position of said magnetic target relative to said three-dimensional array, and (iii) a magnetic dipole moment of said magnetic target.

2. A magnetic anomaly sensing system as in claim 1 wherein three TM sensors from said plurality of TM sensors are collinearly aligned along said axis and are evenly spaced therealong, wherein a central one of said three TM sensors is centrally positioned between a remaining two of said three TM sensors.

3. A magnetic anomaly sensing system as in claim 2 wherein said planar array includes said central one of said three TM sensors.

4. A magnetic anomaly sensing system as in claim 3 wherein said planar array forms a square having one of said plurality of said TM sensors at each corner thereof.

5. A magnetic anomaly sensing system as in claim 4 wherein

said central one of said three TM sensors lies at a center of said square.

6. A magnetic anomaly sensing system as in claim 2 wherein said planar array forms a square having one of said plurality of said TM sensors at each corner thereof.

7. A magnetic anomaly sensing system as in claim 6 wherein said axis passes through a center of said square.

8. A magnetic anomaly sensing system as in claim 7 wherein said planar array is positioned between said central one of said three TM sensors and one of said remaining two of said three TM sensors, said system further comprising a second planar array defined by at least four of said plurality of TM sensors with said second planar array being perpendicular to said axis and positioned between said central one of said three TM sensors and the other of said remaining two of said three TM sensors.

9. A magnetic anomaly sensing system as in claim 8 wherein said planar array and said second planar array are mirror images of one another relative to said central one of said three TM sensors.

10. A magnetic anomaly sensing system as in claim 3 wherein said planar array forms a polygon having one of said plurality of said TM sensors at each vertex thereof, said polygon having opposing sides that are of equal length and parallel to one another.

11. A magnetic anomaly sensing system as in claim 10 wherein said central one of said three TM sensors lies at a geometric center of said polygon.

12. A magnetic anomaly sensing system, comprising:

a plurality of triaxial magnetometer (TM) sensors with each of said TM sensors having X,Y,Z magnetic sensing axes, said plurality of said TM sensors arranged in a three-dimensional array with respective ones of said X,Y,Z magnetic sensing axes being mutually parallel to one another in said three-dimensional array;

said three-dimensional array defining a geometry that (i) collinearly aligns at least three of said plurality of TM sensors in a spaced-apart fashion along an axis to form a plurality of single-axis gradiometers along one of said X,Y,Z magnetic sensing axes, and (ii) positions at least four of said plurality of TM sensors in a spaced-apart fashion in a planar array that is perpendicular to said axis, said planar array defining pairs of single-axis gradiometers wherein each of said pairs is symmetrically disposed about said axis; and

processing means coupled to each of said plurality of TM sensors for generating

(i) partial gradient contractions for each of said single-axis gradiometers, and

(ii) complete gradient tensors and corresponding complete gradient contractions for multi-axis gradiometers formed by said planar array,

in order to provide data that can be used to

(a) align said axis of said three-dimensional array with a magnetic target, and

(b) once said axis is aligned with said magnetic target, uniquely determine (i) distance to said magnetic target, (ii) position of said magnetic target relative to said three-dimensional array, and (iii) a magnetic dipole moment of said magnetic target.

13. A magnetic anomaly sensing system as in claim 12 wherein three TM sensors from said plurality of TM sensors are collinearly aligned along said axis and are evenly spaced therealong, wherein a central one of said three TM sensors is centrally positioned between a remaining two of said three TM sensors.

14. A magnetic anomaly sensing system as in claim 13 wherein said planar array includes said central one of said three TM sensors.

15. A magnetic anomaly sensing system as in claim 14 wherein said planar array forms a square having one of said plurality of said TM sensors at each corner thereof.

16. A magnetic anomaly sensing system as in claim 15 wherein said central one of said three TM sensors lies at a center of said square.

17. A magnetic anomaly sensing system as in claim 13 wherein said planar array forms a square having one of said plurality of said TM sensors at each corner thereof.

18. A magnetic anomaly sensing system as in claim 17 wherein said axis passes through a center of said square.

19. A magnetic anomaly sensing system as in claim 18 wherein said planar array is positioned between said central one of said three TM sensors and one of said remaining two of said three TM sensors, said system further comprising a second planar array defined by at least four of said plurality of TM sensors with said second planar array being perpendicular to said axis and positioned between said central one of said three TM sensors and the other of said remaining two of said three TM sensors.

20. A magnetic anomaly sensing system as in claim 19 wherein said planar array and said second planar array are mirror images of one another relative to said central one of said three TM sensors.

21. A magnetic anomaly sensing system as in claim 14 wherein said planar array forms a polygon having one of said plurality of said TM sensors at each vertex thereof, said polygon having opposing sides that are of equal length and parallel to one another.

22. A magnetic anomaly sensing system as in claim 21 wherein said central one of said three TM sensors lies at a geometric center of said polygon.